

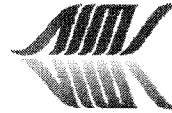
Submission No. 1

(AIMS)

SL Date: 22/10/09



Australian Government



**AUSTRALIAN INSTITUTE
OF MARINE SCIENCE**

AIMS TROPICAL MARINE RESEARCH FACILITIES PROJECT

Cape Ferguson and Townsville Works

STATEMENT OF EVIDENCE
TO THE
PARLIAMENTARY STANDING COMMITTEE
ON PUBLIC WORKS

Australian Institute of Marine Science
Cape Ferguson, Townsville, QLD

Submission no. 1
Date of Submission: October 2009



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CONTENTS

PART A – IDENTIFICATION OF THE NEED.....	5
1 INTRODUCTION	5
2 BACKGROUND	6
3 PROJECT OBJECTIVES	8
4 NEED FOR THE WORKS.....	9
5 OPTIONS CONSIDERED	13
6 PROPOSAL DESCRIPTION.....	14
7 ECONOMIC IMPACTS	15
8 ENVIRONMENTAL CONSIDERATIONS	16
9 HERITAGE IMPLICATIONS	17
10 SOCIAL AND COMMUNITY IMPACTS	17
11 LONGER TERM PLANNING / RELATED PROJECTS	17
12 CONSULTATION.....	20
13 REVENUE	20
PART B – TECHNICAL INFORMATION	21
14 PROJECT LOCATION	21
15 PROJECT SCOPE.....	21
16 SITE SELECTION AND DESCRIPTION.....	28
17 ZONING AND APPROVALS.....	28
18 APPLICABLE CODES AND STANDARDS.....	28
19 PLANNING AND DESIGN CONCEPTS	29
20 ECOLOGICALLY SUSTAINABLE DEVELOPMENT, WATER AND ENERGY CONSERVATION	29
21 PROVISION FOR PEOPLE WITH DISABILITIES	31
22 OCCUPATIONAL HEALTH AND SAFETY	31
23 STRUCTURAL DESIGN	32
24 MATERIALS AND FINISHES.....	33
25 MECHANICAL SERVICES	33



AIMS TROPICAL MARINE RESEARCH
FACILITIES PROJECT

26	HYDRAULIC SERVICES	33
27	ELECTRICAL SERVICES.....	34
28	FIRE PROTECTION	34
29	CIVIL WORKS	35
30	LANDSCAPING	35
31	SECURITY	35
32	NOISE AND ACOUSTICS	35
33	INFORMATION COMMUNICATION AND TECHNOLOGY	36
34	PROJECT COST	36
35	PROJECT DELIVERY SYSTEM.....	36
36	PROJECT SCHEDULE.....	37
37	ATTACHMENTS	38



PART A – IDENTIFICATION OF THE NEED

1 Introduction

1.1 This evidence to the Parliamentary Standing Committee on Public Works (PWC) presents a proposal to enhance AIMS marine research infrastructure to provide the following capabilities:

- (a) Ocean simulator and seawater enhancements
- (b) Expanded facilities to support growth in Townsville, including a Tropical Marine Collections Facility;
- (c) Implementation of new technologies to reduce energy consumption;
- (d) A vessel berthing and operations facility in Townville
- (e) Enhanced Darwin Research Facilities.

1.2 Only the first four capabilities are covered by this submission. The “Enhanced Darwin Research Facilities” is to be progressed as a separate submission to the Public Works Committee due to its geographic and functional separation from the other capabilities. For details refer the “related works” section.

1.3 To deliver the four capabilities eight specific sub-projects were identified and developed. The sub-projects are as follows:

PART A – IDENTIFICATION OF THE NEED
CAPE FERGUSON & TOWNSVILLE

Capability	Sub-Project
(i) Ocean Simulator and Seawater Enhancements	1. Australian Tropical Oceans Simulator (ATOS)
	2. Seawater Infrastructure Upgrade
(ii) Expanded facilities to support growth in Townsville	3. Tropical Collections Facility and Office Extension
	4. 11KV Power Supply and Backup
	5. Field Work Preparation Area (only to occur if contingency budget is not expended)
(iii) Implementation of new technologies to reduce energy consumption	6. Off Peak Chiller Plant
	7. Energy Efficiency Project
(iv) A vessel berthing and operations facility in Townville.	8. Vessel Berthing Facility

1.4 The eight sub-projects are collated to form the AIMS Tropical Marine Research Facilities Project - Cape Ferguson and Townsville works (Project). Abbreviations used in the document are contained within Attachment 1.

2 Background

2.1 The Project is an initiative of the Australian Government under the Super Science Initiative with funding from the Education Investment Fund (EIF). The funding also supports the Government's economic stimulus package.

2.2 The funding has been provided over three years (2009/10 to 2011/12) with the contract for funding being between Australian Institute of Marine Science (AIMS) and the Department of Innovation, Industry, Science and Research (DIISR).

2.3 The 207 hectare Cape Ferguson site was chosen in the nineteen seventies for three main reasons:

- (a) Clear unpolluted seawater
- (b) A site isolated from urban development.
- (c) Room for expansion.

PART A – IDENTIFICATION OF THE NEED CAPE FERGUSON & TOWNSVILLE

2.4 AIMS leases the Cape Ferguson site under a special lease for 'marine research purposes' and currently has approximately 12 hectares developed. This site is protected from the sea by a 'Scientific Research Zone (no public access)' under the control of the Great Barrier Reef Marine Park Authority. An extensive National Park separates the site on all land boundaries. The site itself has 'no public access' except by arrangement, and access control and strategically placed cameras ensure compliance of this. The following photograph displays the site location.



2.5 The Project builds on AIMS internationally recognised capabilities in marine biodiversity, water quality and ecosystems health, marine microbiology and symbiosis, and impacts and adaption to climate change. The facilities provided through this Project will support research that is directly relevant to the National Research Priorities; to sustainable development in tropical Australia; and to the understanding of the

capacity of marine ecosystems to adapt to climate change and develop appropriate mitigation options.

- 2.6 AIMS' consultative planning processes and related national assessments¹ identified major opportunities and challenges facing Australia's tropical marine and coastal domain. AIMS' Strategic Directions and Research Plan (see www.aims.gov.au) identify the research, development and innovation required to deliver the actionable knowledge, data and new technologies needed by government, industry and the community to realise the opportunities and to respond to the challenges of Australia's marine territory with a focus on the tropics. The capability enhancements being provided by the ATRMF will assist AIMS in meeting these ongoing challenges.
- 2.7 Collaboration is central to AIMS' organisational culture and has been the key mechanism for increasing critical mass and broadening the skill base required to address the complex questions of sustainable use and protection of marine resources. This approach includes national and international collaborations, strategic alliances and strong links to industry and community. Through it, AIMS makes its facilities available to a broad cross section of the marine science community and coordinates its effort and resources with other research organisations. AIMS will continue to implement this approach ensuring that the facilities:
- a) support relevant, collaborative research;
 - b) enhance national capabilities; and that
 - c) data is managed and effectively transferred to users.

3 Project Objectives

- 3.1 The objectives of the Project are to enhance Australia's marine science capacity. Infrastructure developed through this Project is building on Australia's strengths in marine science and will directly contribute to the National Research Priorities and

Australian Climate Change Research: Perspective on Successes, Challenges and Future Directions, 2007; *The Review of the National Innovation System – Venturous Australia* 2008; *Strategic Roadmap for Australian Research*, August 2008; *Powering Ideas – An Innovation Agenda for the 21st Century*, May 2009; *Australian Climate Change Science – A National Framework*, May 2009; The Oceans Policy Science Advisory Group paper - *A Marine Nation: National framework for Marine research and Innovation*, March 2009.

National Innovation Priorities. The Project will provide an internationally significant capability to deliver research outcomes aligned with the Super Science initiative.

- 3.2 Broadly, the infrastructure will provide facilities at AIMS that will deliver research relevant to the needs of the sustainable use and protection of the marine environment and improve understanding of the impact of change (including climate change and coastal impacts) on marine ecosystems. The facilities will be operated against the framework of AIMS' well-established planning process:
- a) ensuring relevant mission-focussed research;
 - b) boosting collaborative, world class scientific and technological research; and
 - c) co-ordinating effort in tropical marine science.

4 Need for the Works

- 4.1 The infrastructure projects will support AIMS capability by addressing the following needs at the AIMS Cape Ferguson Site and the Townsville Port.
- 4.2 **Ocean Simulator and Seawater Enhancements** – The construction of the AIMS Tropical Oceans Simulator (ATOS) will build significant national infrastructure to support cutting edge research on critical climate adaptation and mitigations issues such as ocean acidification and ocean warming. The facility would provide a unique capacity to support experimental work by providing the ability to control parameters such as temperature, salinity and contaminants in large volumes of seawater. This experimental capability would significantly reduce the timeframes required to evaluate future climate scenarios and therefore increase the likelihood of timely intervention to protect Australia's coral reefs and other marine ecosystems. The facility would be co-located within the AIMS Centre for Marine Microbiology and Genetics creating a truly world leading research facility that would attract national and international researchers.
- 4.3 In parallel with the ATOS development improvements to seawater supply infrastructure are required. AIMS currently extracts 600,000 litres of seawater each day to pass through its seawater experimental facilities (primarily tropical aquaculture facilities). The AIMS Cape Ferguson site is located in an area with high quality coastal water; however, despite its location, salinity can fall below tolerable levels during the wet

season and turbidity can be high in high wind conditions. This is a significant issue for long run experiments since months or years of research could be lost. Additionally the seawater pumping system is at its limit and there is no capacity to supply seawater into the ATOS facility without reducing other research programs. There is therefore, a need to improve the “security” of supply as well as increasing flow rates. In response to these issues AIMS has adopted a threefold strategy;

- (a) Increase the volume of seawater being pumped from the ocean to 1 million litres each day.
- (b) Incorporate large storage ponds to enable experimental systems to operate on stored water when ocean salinity or turbidity are outside required levels.
- (c) Incorporate recirculation systems to increase water usage efficiency and enable experimental flows in excess of 1 million litres per day.

4.4 This strategy will enhance AIMS’ seawater supply, providing improved supply (reliability, salinity control and filtration) to existing experimental facilities along with an increase in capacity (flow rate) required for operation of the tropical oceans simulator.

4.5 **Expanded Facilities to Support Growth in Townsville** - Co-investment in research has enabled AIMS to grow and projections are for continued growth. This growth and shifts in operational needs means that AIMS requires additional general science workspaces and upgraded building services (e.g. 11kV power supply). The infrastructure will include a ‘Tropical Collections’ facility to house AIMS’ internationally important biological collections, including the unique coral core collection, both increasing security and access to these important collections by national and international researchers and industry. The improvements to be implemented will facilitate improved science by AIMS personnel and most importantly enhance access to national and international researchers to derive the full value from these collections.

4.6 **Implementation of new technologies to reduce energy consumption** – This project is driven by three key needs:

-
- a) Over the last 10 years AIMS has expanded its research capabilities resulting in increased CO² generation. While it has undertaken a number of projects designed to reduce energy consumption it has not had sufficient funds to implement larger changes. The combination of the proposed new facilities along with increased energy costs makes it crucial to redress this issue and significantly improve efficiencies. Furthermore AIMS has an ultimate goal of operating its Cape Ferguson facilities on a carbon neutral basis and improved efficiencies are a key aspect to achieving this goal. While a specific energy reduction target has not been set (i.e. the reduction will be an outcome, based on a case by case cost benefit assessment of reduction options) preliminary assessments are that a 20% to 30% reduction is feasible inclusive of the impact of increased electricity utilisation associated with other projects in this proposal. This will result in operational cost savings, reduce AIMS CO² generation, and significantly move the site forward towards operating on a carbon neutral basis.
- b) Experimental research requires highly reliable cooling and heating of the seawater. Some experiments are anticipated to last months (perhaps years) and for some of these experiments loss of accurate and reliable temperature control would result in a complete loss of valid results.
- c) In addition to the internal drivers there is a broader regional North Queensland issue of reducing peak power generation to avoid the need to expend significant capital on peak period energy generation and/or new transmission capacity. AIMS has been working with Ergon Energy (North Queensland energy provider) to identify solutions that both reduce overall energy consumption and reduce peak period usage.
- 4.7 A good example of the works being undertaken under this capability area is the incorporation of an off-peak chilled water plant. The system works by chilling a large water tank overnight that is subsequently utilised as the “cold energy source” in air conditioning and seawater cooling systems. It will therefore improve efficiency by replacing old compressor based air cooling units; significantly reduce peak energy utilisation by chilling over night; and increase reliability by virtue of a large “stored” cold energy source.

- 4.8 **A vessel berthing and operations facility in Townville** - AIMS has historically leased berthing facilities in the Ross River however, due to a new port road being constructed to service the Townsville Port, access to the river will no longer be possible and AIMS has now been forced to move to temporary facilities in Ross Creek. In response to the river closure the Port of Townsville Limited (PoTL) is developing a new light commercial marine precinct area adjacent to its existing heavy commercial wharves. AIMS requires a vessel berthing and operations facility with appropriate and safe access and the new marine precinct will provide the only viable location in Townsville (AIMS vessels are too large for the marina berths and too small to safely access within the heavy commercial port). In addition AIMS believes that an ability to host visiting research vessels would generate additional collaboration opportunities with international marine science organisations for the region. As AIMS lease had recently expired AIMS is not considered an “impacted party” from a compensation perspective, therefore any development would be at AIMS cost.
- 4.9 The project works are required to be implemented as per the project program to avoid:
- (a) Delays due to North Queensland’s wet season. If the construction window within the 2010 dry season (commencing approximately April 2010) is to be maximised then tendering for design and construction is required to commence in November 2009. Delays in approvals would incur disproportionate future delays as work would need to be rescheduled into 2011.
 - (b) Delays in the implementation of critical infrastructure to meet immediate research priorities.

5 Options Considered

5.1 For each primary objective of the 4 capabilities a set of options were assessed. The best options reflect the nominated sub-projects. The following table is a summary of the options analysed and the selected option, for completed details refer to Attachment 7.

Capability	Objective	Options: (highlighted option selected)
Ocean simulator and seawater enhancement	To improve AIMS seawater experimental research facilities	<ul style="list-style-type: none"> • Develop facilities at AIMS (Project 1) • Utilise existing facilities at a new location • Develop a facility at another location
	To improve AIMS seawater supply infrastructure	<ul style="list-style-type: none"> • Operate fully using a recirculation system • Install sophisticated filtration and salinity adjustment systems plus increased pumping capacity • Increase pumping and storage capacities along with partial recirculation capabilities (Project 2).
Expanded Facilities to Support Growth	To create additional space for AIMS scientists in support of the increased co-funded research resulting in increased numbers. To improve the storage (and access) facility of AIMS internationally significant coral core and bio-resources collections.	<ul style="list-style-type: none"> • Develop the facilities at AIMS (Project 3) • Move AIMS staff to other locations • Utilise facilities in a new location • Develop facilities at another location.
	Secure and enhance the Cape Ferguson 11KV supply	<ul style="list-style-type: none"> • Do nothing (does not meet functional needs) • Implement 11KV enhancements (Project 4)
Energy Reduction	To improve the efficiency	<ul style="list-style-type: none"> • Do nothing

PART A – IDENTIFICATION OF THE NEED
CAPE FERGUSON & TOWNSVILLE

Capability	Objective	Options: (highlighted option selected)
	and increase the capacity of AIMS HVAC and seawater cooling systems	<ul style="list-style-type: none"> Expand using existing technology Implement an off-peak central chiller plant (Project 6)
	Reduce general energy consumption at the Cape Fergusson	<ul style="list-style-type: none"> Do nothing Implement highest priority items as identified in 2008 energy audit (Project 7)
Vessel Berthing and Operations Facility	To secure permanent berthing facilities for AIMS two large research vessels	<ul style="list-style-type: none"> Rent space in new light commercial precinct Purchase / construct facilities in new commercial precinct (Project 8) Locate vessels in another existing location in Townsville Utilise heavy commercial port Develop berthing facilities at AIMS Cape Fergusson Site Move vessel berthing to another Port

6 Proposal Description

6.1 The Project comprises 7 discrete sub-projects:

- (a) **Australian Tropical Oceans Simulator (ATOS)** - the facility will be a large building containing controlled environment seawater rooms along with the associated equipment to manipulate both seawater and atmospheric conditions. It will be located separate to existing facilities.
- (b) **Seawater Infrastructure Upgrade** – this infrastructure will consist of upgrading of the existing pumping system, increase the number of seawater storage ponds and tanks, incorporate the ability to filter the seawater at three primary transition

points and recirculate water back to the storage ponds and installation of a small wastewater treatment system.

- (c) **Tropical Collections Facility and Office Extension** - This facility will construct a three story extension (North Wing) to the main Cape Ferguson research complex incorporating storage areas, workshops and offices.
- (d) **11KV Power Supply and Backup** - This infrastructure will provide adequate high voltage supply (11KV power supply) via a new network of electrical cabling in conduits and an appropriate diesel generator backup power source for the site with suitable High Voltage (HV) electrical reticulation to all facilities.
- (e) **Off Peak Chiller Plant** - This infrastructure will provide reduced energy consumption and improve the efficiency and increase the capacity of AIMS HVAC and seawater cooling systems infrastructure.
- (f) **Energy Efficiency Project** - This project will provide a combination of passive measures such as dynamic building controls and active measures such as moving to more efficient lighting.
- (g) **Vessel Berthing Facility** – This project will provide a vessel berthing and operations facility within the new light commercial marine precinct at Townsville Port with appropriate and safe access to AIMS' research vessels and capability to host larger visiting research vessels.

7 Economic Impacts

- 7.1 The Project will not produce revenue or additional ongoing employment opportunities. The Project will generate short-term employment opportunities predominantly in the building, construction and unskilled labour markets during construction. It will also generate some off-site job opportunities from the manufacture and distribution of construction related materials over a period of approximately 18 months. It is anticipated that local regional building contractors and regionally based tradespersons will be employed on a large proportion of the construction works.

- 7.2 The completed facilities will provide the necessary infrastructure for AIMS to meet the projected demand for scientific outcomes and thus enable the employment and collaboration of additional staffing within the facilities.
- 7.3 The potential multiplier effect of wider employment in Australia due to the research outcomes to be achieved within the new facilities should also not be discounted.

8 Environmental Considerations

- 8.1 The Cape Ferguson site is located within a 'brownsfield site' that was previously cleared during the establishment of the AIMS facility in the mid 1970's. The Institute has a progressive tree planting program that has seen 300 local native trees propagated and planted in the last 2 years.
- 8.2 The concept design for the infrastructure Project has been developed in accordance with AIMS environmental policy and procedures. The works will also be subject to a Project specific environmental and heritage impact assessment. The assessment will identify potential environmental impacts of the Project and to suggest appropriate mitigation measures.
- 8.3 The vessel berthing facility is located within the Port of Townsville marine precinct. The Port of Townsville Limited (PoTL) will be responsible for undertaking an environmental and heritage impact assessment on the proposed area to be leased to AIMS.
- 8.4 An Environmental Consultant will undertake a review of all relevant environmental documentation. However based on prior experience and reports it is expected that the environmental impacts of the Project at Cape Ferguson are unlikely to have a significant impact on the environment. The Project will continue to be managed through internal AIMS processes. There is currently no requirement to seek further consideration or approval by the Minister for the Environment, Heritage and the Arts.

9 Heritage Implications

- 9.1 An assessment is being undertaken to assess heritage implications associated with the proposed new facilities. However, based on prior master planning and reports undertaken on site we consider the likelihood of heritage implications to be remote.
- 9.2 At the Port of Townsville the PoTL will be responsible for undertaking an environmental and heritage impact assessment on the proposed area to be leased to AIMS.

10 Social and Community Impacts

- 10.1 The Project will employ skilled construction workers from the Townsville region and adjoining regions providing a positive impact to small and medium businesses.
- 10.2 The contractor will be required to provide traffic, environment and site management plans for approval by AIMS.
- 10.3 Given the remote location of the Cape Ferguson site there will be minimal disruption to the local community during the construction period.
- 10.4 The vessel berthing facility works will be undertaken within the framework of the larger general Port of Townsville redevelopment. This redevelopment is required to mitigate against the social and community impacts of a new bridge that will limit access up the river with consequential affects on the local marine industry.

11 Longer Term Planning / Related Projects

- 11.1 In order to ensure that the Project budget is not exceeded and that the major capabilities of the Project are delivered, AIMS has incorporated budget allowances ('contingencies') into the Project Plan. Generally only construction contingencies have been allowed for in the budget. The combination of having already completed considerable design and costing for each sub-project has allowed the Project to be established without the need for significant design contingencies. To fund these

PART A – IDENTIFICATION OF THE NEED
CAPE FERGUSON & TOWNSVILLE

contingencies the work-scope in a number of the sub-projects has been reduced from that originally proposed.

11.2 During the Project, the budget and construction program will be continually reviewed to determine if contingencies are being utilised or if funding is available to allow the following items to be progressively reincorporated back into the work-scope. The critical path of construction implementation creates timing cut-offs, beyond which certain contingency items cannot be progressed. For this reason the list of contingency items exceeds the contingency allowances for the Project, and therefore even under ideal circumstances only some of the items will be progressed.

Item	Description
1. Planned size (24m x 18m) of the North Wing delivered.	Reduced building size (18m x 18m) to create contingency and allow for necessary scientific equipment. If funds are available this will be reverted back to the original size. It is prioritised so highly as future extensions would be cost prohibitive.
2. Laboratories on the 2 nd floor of North Wing established	The planned laboratory space (supporting climate change research in the North Wing) would be built. The new building will be constructed with allowances for fume cub-boards and separate HVAC but to reduce costs the second floor is configured as offices. If funding is available approximately 50% of the 2 nd floor will be laboratories.
3. Increased ATOS experimental capability	Construction of portable seawater treatment systems to enable field based experiments to be undertaken in parallel with those occurring in the ATOS facility. This capability would be utilised to assist in offsetting the compromises inherent in laboratory based research.
4. Field services work area and field work preparation area	A functional field staging facility requires re-configuration of the existing facility. This includes construction of a site maintenance workshop; conversion of the existing site maintenance area to a field services team area; and construction of a covered and lockable area.
5. Vessel Berthing Facility Storage Shed and Offices, plus small derrick	Currently the budget assumes only a small storage shed would be constructed. This contingency item is to construct a 300m ² combined industrial storage shed and office area, along with the installation of a small loading derrick.

PART A – IDENTIFICATION OF THE NEED
CAPE FERGUSON & TOWNSVILLE

Item		Description
6.	Additional large storage pond	Originally 10ML of storage was incorporated in the design. This has been reduced to 7.5ML, with an additional 2.5ML of storage will be installed, further “wet season” proofing AIMS seawater related research if funds are available.
7.	Increased ATOS experimental area	This item is to extend the enclosed areas by 200m ² . Original specifications identified 1100m ² of enclosed space but this has been reduced 900m ² based on current budget.
8.	Internal building modifications to improve operational efficiency.	In order to improve efficiencies it is desired to both: <ul style="list-style-type: none"> • Increase scientist space adjacent to laboratories (by moving support staff from these areas); and • Create co-located functional work areas.

11.3 The Darwin Laboratory Expansion Project is also funded under the Tropical Marine Research Facilities Project as part of a package of projects announced under the Super Science initiative.

11.4 Due to the nature of the works and the geographical location of the facilities, The Darwin Laboratory Expansion Project is notified independently to the Public Works Committee.

11.5 The Darwin Laboratory Expansion Project will extend the current Arafura-Timor Research Facility (ATRF) into unused adjacent land leased from the Australian National University (ANU) which is adjacent to Charles Darwin University (CDU). The extension of the ATRF will establish a marine science hub that will be the focus of marine science research in the Northern Territory and the broader Arafura-Timor Seas region. The hub builds on partnerships between AIMS, CDU and ANU. The initial focus of research at the facility will be on north Australian coastal processes from catchment to coast, drawing together research efforts to establish multidisciplinary integrated studies in key catchment and estuarine systems. The extended facility will comprise a mixture of offices, meeting areas, workshops, storage space, and laboratories, additional parking and landscaping. The work-scope includes construction and fit out, including the provision of specialist equipment.

12 Consultation

- 12.1 AIMS develops its research plans in consultation with its stakeholders, furthermore collaboration is central to AIMS' organisational culture and has been the key mechanism for increasing critical mass and broadening the skill base required to address the complex questions of sustainable use and protection of marine resources. This approach includes national and international collaborations, strategic alliances and strong links to industry and community. Through it, AIMS makes its facilities available to a broad cross section of the marine science community and coordinates its effort and resources with other research organisations.
- 12.2 AIMS has, and will continue to, consult with research partners and collaborating institutions in the development and implementation of this Project. For example in developing preliminary functional specification for the Australian Tropical Oceans Simulator both national and international collaborators have been consulted. This consultation will continue throughout the design process through user groups comprising selected experts in the areas of science for which the facility will be utilised.
- 12.3 Discussions with the various statutory bodies governing water catchment, power and emergency services are in this instance regarded as unnecessary as a consequence of there being no impact of the Project beyond the AIMS Cape Ferguson site. No local community or other interest groups have been identified that would be affected by the Project works at Cape Ferguson.
- 12.4 As a part of the wider development at the Port, the PoTL and the State Government are responsible for effective consultation with the relevant stakeholders and community groups. AIMS is an end user of the completed facility and hence one of the relevant stakeholders within the wider port redevelopment project.

13 Revenue

- 13.1 No revenue will be derived from the Project.

PART B – TECHNICAL INFORMATION

14 Project Location

14.1 The Project elements within the existing AIMS Cape Ferguson Site are located approximately 50km south east of the Townsville CBD as shown in Attachment 2 and Attachment 3. The site sits adjacent to the centre of the Great Barrier Reef and is surrounded by a national park and marine reserve. The site encompasses an area of 207.4 hectares. The works are located in the Electorate of Dawson and Mr James Bidgood MP is the sitting Member. Most of AIMS staff and local business is located in the Electorate of Herbert - the Hon Peter Lindsay MP is the sitting Member.

14.2 There are several site development options in the Townsville port marine precinct being developed and reviewed by the PoTL. AIMS will participate in this development process, with a final decision expected in early 2010. Depending on the final development option selected, the size and aspect ratio of the AIMS vessel berthing facility may change. The Townsville works are located in the Electorate of Herbert - the Hon Peter Lindsay MP is the sitting Member.

15 Project Scope

15.1 The work scope comprises seven project elements:

AIMS Tropical Oceans Simulator (ATOS)

15.2 ATOS will be built on the AIMS site (Cape Ferguson) near Townsville. It will create a new capacity for experimental work by providing the ability to accurately control parameters such as temperature, acidity, salinity, sedimentation and contaminants in large volumes of seawater and/or high numbers of replications. Furthermore, these capabilities are to be provided in a fully climate controlled facility. The work scope will consist of the following:

- (a) A large building (or two smaller buildings) with the following characteristics:
 - (i) 800 to 1000m² of enclosed space, insulated and air conditioned.
 - (ii) 900m² of additional covered space.
 - (iii) 800m² of hard stand area.

- (iv) The enclosed space to be fitted with 8 to 16 environmentally controlled rooms, each with separate Heating, Ventilating and Air-Conditioning (HVAC) and lighting.
- (v) The environmentally controlled rooms to be fitted with tanks, workbenches, piping, controls and other requirements necessary to undertake experimental work.
- (b) Systems to circulate seawater.
- (c) Systems to treat seawater, including heating, cooling, filtration, acidity and salinity adjustment, biological, nutrient and sedimentation adjustment.
- (d) Process control, monitoring and alarm systems.
- (e) Sumps, tanks, recirculation systems to support the operation of the facility

Seawater Infrastructure Upgrade

15.3 Five specific aspects of AIMS seawater infrastructure are to be enhanced:

- (a) *Seawater Extraction*: Upgrading of the existing pumping system to increase the daily flow from 600,000 litres per day to 1 million litres per day.
- (b) *Seawater Storage*: Increase seawater storage, diversity and rain protection by:
 - (i) Increasing the number of ponds and tanks from a combined storage volume of 3 million litres to approximately 7.5 million litres.
 - (ii) Including five, 1 million litre storages and one larger storage into the design to increase diversity of both seawater treatment prior to use and the recirculation options available.
 - (iii) Allow for all storages to be covered when required to both avoid the intrusion of fresh water during the wet season and to shade storages and prevent excessive biofouling.
- (c) *Seawater Filtration and Treatment*: Incorporate the ability to filter the seawater at the three primary transition points:
 - (i) Between the seawater pumps and the primary storages
 - (ii) Between the primary and secondary storages
 - (iii) Between the secondary storages and AIMS seawater research facilities, including the new ATOS facility

- (d) *Recirculation*: Incorporate the ability to recirculate water back to the 1ML secondary storage ponds.
- (e) *Seawater Discharge Treatment*: Currently most research activities on the AIMS site using the bulk seawater supply system do not require specific treatment with the seawater discharged into a purpose built wetlands area within the AIMS lease. All research activities that do require specialised treatment are operated in purpose built recirculation systems with associated treatment systems (for example PC2 aquaria), however these are limited to very small flow rates due to the expense involved in treatment systems. Given the volume of seawater used each day (up to 1 million litres per day) it is prohibitively expensive to treat the entire discharge for a broad spectrum of contaminants and it is not required. For efficient operations it will be necessary to match the type of treatment with the experiment being conducted. This component of the seawater upgrade will therefore create several additional bulk seawater wastewater discharge lines enabling focused discharge treatments:
- (i) No treatment required
 - (ii) Treatment type 1 (e.g. UV treatment)
 - (iii) Treatment type 2 (e.g. biological filtration)
 - (iv) Spare (for future enhancements)
- (f) As part of this Project, a small treatment system (up to 250KL/day) which is designed to filter inorganic, organic and biological matter then treat with ultraviolet (UV) will be installed.
- (g) A schematic of the proposed seawater infrastructure is provided in Attachment 5.

Tropical Collections Facility & Office Extension

15.4 This project is designed to achieve the dual objective of creating the AIMS Coral Core Library and creating additional science space to support research collaborations. The project goal is to bring together into a single location AIMS climate change and coastal development research involving coral cores into a single location, including coral core technical workshops and storage. This facility will be utilised by AIMS, but equally importantly will enable AIMS to increase its collaboration in this area. The potential knowledge to be extracted from AIMS coral core collections is well beyond that which AIMS can achieve with its resources. This facility is therefore designed to facilitate

external researchers coming to AIMS to access the cores and undertake testing and measurement activities. The work scope will consist of the following:

- (a) Construct an 18 metre by 18 metre (972 m²) three story extension, connected to the main complex by flyovers. This will create approximately 850m² in additional research space (laboratories, workshops and offices). This includes all support infrastructures such as HVAC, IT, lighting and power.
- (b) Fit-out of the basement floor for coral core storage and testing, including storage systems and testing equipment.
- (c) Fit-out floor two as offices and a laboratory.
- (d) Fit-out floor three as offices.
- (e) Construct an access road to the basement area.
- (f) External site works: site preparation; roads and car parking; paving; landscaping; drainage; lighting; electrical upgrade and extend water and sewer.

11KV Power Supply and Backup

15.5 This project is designed to improve supply reliability for the AIMS Cape Ferguson site. This is critical due the need to maintain supplies to experiments that operate over long periods and to systems that maintain sample libraries (for example minus 60°C freezers). AIMS is located at the end of a of power supply line which cannot reticulate power from another source. This line is unreliable with frequent outages occurring, necessitating the need for a robust backup system. Currently this does not exist therefore the 11KV reticulation system is to be converted to a “ring main” and additional backup generators installed. The existing backup generators are undersized and several key systems cannot be supported, including IT server room air conditioning and AIMS seawater heating and chilling systems, while the internal 11KV system is a “single line” with failures directly impacting supplies. Installation of a ring main will reduce the impact failures on supplies.

15.6 The work scope comprises the provision of adequate high voltage supply (11KV power supply) via a new network of electrical cabling in conduits and an appropriate diesel generator backup power source for the site with suitable High Voltage (HV) electrical reticulation to all facilities. The project will provide the capability to feed the site Low

Voltage (LV) in an emergency should power be lost from the mains supply. Specifically the following will be implemented:

- (a) Connection of the following new facilities:
 - (i) Australian Tropical Oceans Simulator (ATOS) - a nominal 1000 m² of controlled environment rooms.
 - (ii) Seawater Infrastructure.
 - (iii) North Wing - a nominal 972 m², three storey building (laboratory, office and storage).
 - (iv) Central Chiller Plant.
- (b) Supplementation of existing transformers with two by 750kVa transformers and switching equipment.
- (c) Installation of a second backup diesel generator (1000 kVa; 1400amps) - the existing backup diesel generator is currently loaded at 98% capacity with several critical systems unsupported.

Off Peak Chiller Plant

15.7 This sub-project will construct a site wide distributed cooling system incorporating a Central Chiller Plant. The Central Chiller Plant is a centralised plant containing high efficiency water cooled chillers, cooling towers, pumps and a large scale stratified thermal energy (chilled water) storage tank . Thermal Energy Storage will make use of night periods when the site demand for cooling is reduced, by chilling water in a large storage tank (from approximately 13°C back to 6°C). During times when the site demand is high the chilled water is drawn from the storage tank and reticulated throughout the site and delivered to fan coil air-conditioning units within each building. Additionally the chilled water will be circulated through the new Australian Tropical Oceans Simulator (ATOS) to provide a cold energy source for adjusting the temperature of seawater in experiments.

15.8 The work scope will consist of the following

- (a) Installation of underground chilled water piping systems for current and future buildings with master planning for future growth. Piping reticulation will include cooling loads for the sea water system. Approximately three kilometres of underground piping across the site.

- (b) Construct a 400m² central energy plant building to house the chiller trains. This building is acoustically sealed and air-conditioned to assist in efficiency of plant equipment and to maintain the environmental conditions to reduce the high level of corrosion at this site.
- (c) Install three chiller trains sized for two plants to operate with a standby plant switching operation for optimum running costs and reliability.
- (d) Construct a Thermal Energy Storage Tank, a steel tank with an internal liner of approximately twenty four metres diameter and eighteen metres height.
- (e) Provide connections to existing buildings and modifications to the main building, south wing and mariculture offices required to suit the central plant performance requirements.
- (f) Install associated electrical and controls infrastructure across the site to monitor and fine tune performance to gain optimum electrical and cooling loads and efficiencies for the site.

Energy Efficiency Project

15.9 In line with the project objective of reducing electrical energy consumption resulting in both operating cost reductions and reductions in AIMS environmental footprint, the following works are to be executed:

- (a) Energy Monitoring & Control Systems - Installation of segregated meters in electrical switchboards across all buildings to monitor discrete usage across the site. This monitoring and reporting system will enable AIMS to determine high and/or inefficient areas of usage. It will provide the facility the ability to track energy use and manage this appropriately via a building management system using active systems to adjust air-conditioning and lighting levels.
- (b) Upgrade Main Complex Air Handlers - Modernise main complex air handlers to gain energy efficiency and to allow the energy monitoring system to actively adjust air volumes being moved around the facilities air-conditioning systems. The current system utilises inefficient electrical motors and single speed drives. These will be replaced with high efficiency motors and variable speed drives.
- (c) LED Lighting - Replace lighting with high efficiency LED globes - where appropriate the use of LEDs will be implemented across the facility. Whilst initially

expensive to procure, LED'S have significantly less heat output and utilise less power. This provides a dual benefit of direct energy savings and indirect energy savings through reduced air-conditioning load. This provides energy savings the equivalent of 60 to 70 houses.

Vessel Berthing Facility

15.10 This sub-project is to construct a vessel berthing facility in Townsville Port. The Port of Townsville Limited (PoTL) will undertake all of the primary site development works (reclaiming the land, dredging the basin, rock revetments and breakwaters, roads and provision of services). AIMS will then enter into a long term lease (35+ years) with PoTL based on the provision of approximately a 5000m² land lease and a 2500m² water lease (noting that these areas could adjust as the development layouts are finalised). AIMS will then undertake all site improvements (fencing, paving etc) and construct wharf structures suitable for two 35m vessels or one larger vessel along with associated storage facilities. The work scope will consist of the following:

- (a) Construct a wharf structure that provides:
 - (i) Berthing for two 35m vessels or one larger vessel (maximum size will be dependent on the final specification of the marine precinct parameters such as channel and basin depth).
 - (ii) The ability to load heavy equipment using an 80 tonne crane (e.g. small containers, dive chamber).
 - (iii) Facilities for truck based refuelling and sullage removal to occur.
 - (iv) Power and water connections.
 - (v) Safe access to the vessels via floating docs.
- (b) Carry out land improvements that include:
 - (i) Boundary fencing.
 - (ii) Landscaping.
 - (iii) Paving for vehicle access and parking (approximately 2500m²).
 - (iv) Small storage shed of 50m² (a 300m² enclose storage and office area will be incorporated into the design dependent on final costing of the wharf structure and/or if contingency funds are not utilised)

16 Site Selection and Description

- 16.1 The proposed site for the Project is shown in Attachment 4. The site is contained within the AIMS Cape Ferguson boundary. The Queensland Government is the registered owner of the Cape Ferguson land with AIMS the leasee pursuant to a 50 year lease granted in 1974 under section 203(a) of the Land Act. The land is accessed from Cape Cleveland Road via the Bruce Highway. The selection of the site has been undertaken in accordance with the AIMS Master Plan. A technical site selection process was conducted addressing AIMS environment, heritage and operational considerations.
- 16.2 There are several development options in the Townsville Port marine precinct being developed and reviewed by PoTL. Attachment 6 is an example of an option for the AIMS facility demonstrating the relative scale.

17 Zoning and Approvals

- 17.1 The Cape Ferguson elements will be constructed on State Leased and AIMS controlled land therefore no external civilian authority, zoning or development approvals are required with AIMS being defined as self assessable under the Integrated Planning Act. This proposal does not require the acquisition of additional land or involve land disposal aspects. There will be no change to existing land use conditions at the Cape Ferguson site which is ‘marine research purposes’ – Refer Special Lease No. 38558.
- 17.2 The Vessel Berthing Facility will be constructed on land leased from the PoTL. The infrastructure will be subject to approval by the PoTL and local statutory authority approvals.

18 Applicable Codes and Standards

- 18.1 Where appropriate, the design and construction of the proposed works and services will comply with the relevant sections of the following Standards and Regulations:
- (a) Building Code of Australia
 - (b) Australian Standards and Codes

- (c) The National Code of Practice for the Construction Industry
- (d) Building and Construction Industry Improvement Act 2005 (the BCII Act)
- (e) Building and Construction Industry Improvement (Accreditation Scheme) Regulations 2005 (the Accreditation Scheme Regulations)
- (f) Occupational Health, Safety and Welfare
- (g) Commonwealth and State legislation

18.2 A qualified and practicing building certifier will certify that the design and the finished construction of the facilities meet the requirements of the Building Code of Australia, Australian Standards, and any applicable State and Local Government policies.

19 Planning and Design Concepts

19.1 The Project will provide safe, secure and efficient work and training facilities designed to meet the function of the Project. During the preliminary design stage, consideration was given to the selection of materials, equipment, finishes, construction techniques and build ability. All were considered for an ability to deliver economies and environmentally sustainable efficiencies on a whole-of-life basis. Consideration was given to achieving the necessary functional requirements, work flow patterns and work environment required to fulfil the Project design criteria. The selection of engineering services and associated equipment and energy systems, capital costs were assessed against the operational and maintenance costs.

19.2 The design team consultants undertook site planning studies on the Project. The studies considered many planning issues including:

- (a) the capacity of the site to accommodate the proposed facility as proposed; and
- (b) the development of suitable functional and interconnected relationships between the facility and the site and the existing and proposed infrastructure.

20 Ecologically Sustainable Development, Water and Energy Conservation

20.1 The Commonwealth is committed to Ecologically Sustainable Development (ESD) and the reduction of greenhouse gas emissions. AIMS reports annually to Parliament on its energy management performance in accordance with the Energy Efficiency in Government Operations Policy and on its progress in meeting the energy efficiency

targets established by the government as part of its commitment to improve ESD. AIMS also implements policies and strategies in energy, water and waste management to improve natural resource efficiency and to support its commitment to reducing energy consumption, potable water consumption and waste diversion to landfill. This project has addressed these requirements by adopting cost effective ESD as a key objective in the design development and delivery of new facilities and refurbishments.

20.2 The ESD targets and measures for the Project have been balanced with other requirements for AIMS buildings (e.g. security, heritage considerations, Occupation Health and Safety) to ensure that AIMS operational capability is not compromised. All buildings included in this Project will be designed, constructed, operated and maintained to ensure that they use energy efficiently. Where applicable, the use of the Green Star and NABERS Energy design rating tool has been adopted. In addition, as applicable to the classification of each building, the following policies will be complied with:

- (a) The Energy Efficiency in Government Operations Policy;
- (b) Part I2 and Section J of volume One of the Building Code of Australia; and
- (c) Part 3.12 of Volume Two of the Building Code of Australia.

20.3 An environment and heritage impact assessment will be undertaken addressing:

- a) **Ecological Sustainable Development (ESD) Principles: electricity, gas, hydrocarbons, water.** The project is expected to improve the water and energy consumption relative to current baseline levels. This will be achieved by incorporating ESD principles, such as building orientation, stormwater harvesting and energy efficient appliances into the design and complying with the 'Green at AIMS' initiative.



Green at AIMS logo

- b) **Stormwater management.** There is potential for construction activities such as excavation to expose soil which can infiltrate stormwater. The construction of roofed facilities and hardstand areas has the potential to increase ongoing stormwater flows. However, mitigation measures will be undertaken such as capture, storage and reuse of rainwater from roofed areas, design of stormwater drainage systems in accordance with applicable standards and establishment of vegetation.
- c) **Flora and fauna.** The redevelopment site is a brown field site with no significant flora, fauna, vegetation communities or aboriginal heritage sites. Planting of landscape features and re-vegetation will be undertaken as a component of the project.
- d) **Soil and groundwater contamination.** The environment and heritage review may identify the potential for some localised contamination at the site due to their location within the established areas of the Institute. Preliminary contamination sampling has been undertaken at the development site. The project has allowed for localised treatments being undertaken at each site.

20.4 A Construction Environmental Management Plan (CEMP) is to be developed and endorsed prior to construction commencing addressing any construction conditions detailed in the environmental assessment documentation. Environmental Clearance Certificates (ECCs) will also be required for each element of the Project.

21 Provision for People with Disabilities

21.1 Access and facilities to the new building will be provided in accordance with the Building Code of Australia (BCA), Australian Standards and AIMS procedures.

22 Occupational Health and Safety

22.1 The proposed facility will comply with the requirements of the Occupational Health and Safety Act, the AIMS Health and Safety Manual and relevant Queensland Government Health and Safety legislation. The construction contractor will be required to develop and implement an approved Health and Safety Plan incorporating compliance with AIMS Health and Safety policies.

22.2 The site will be secured to prevent unauthorised public access during the construction period. No special or unusual public safety risks have been identified.

23 Structural Design

23.1 Structural design will take into account the soils and weather conditions encountered in the site area and the Port of Townsville facility will also focus on reclaimed land management. The following table lists the structural elements for each relevant project:

Project	Structural Elements
ATOS	Piping and subground conduits with concrete floor slabs and reinforced concrete and steel framing for accommodation of experimental rooms and spaces. Corrosion resistant additives and coatings to be incorporated within the design specification.
Seawater Infrastructure	Piping and subground conduits. Lined Storage ponds, Concrete floor slabs and reinforced concrete and steel framing for accommodation of the filtration plant and water treatment system
Tropical Collections Facility	Reinforced concrete framed structures with concrete floor slabs, block faces or equivalent external walls, and a metal roof appropriate to the environment. Internal walls would be non-load bearing frames lined with plasterboard to provide for maximum flexibility in future floor layouts
11KV Power Supply	Cabling and subground conduits with concrete floor slabs for accommodation of the generator.
Off Peak Chiller Plant	Piping and subground conduits with concrete floor slabs for accommodation of the chiller plant and tank. The thermal storage tank will be a steel tank with an internal liner. The chiller equipment will likely be incorporated within a reinforced concrete building with steel framed roofing.
Vessel Berthing Facility	Concrete piles, floating pontoons and reinforced concrete pier deck. Concrete and asphalt pavements sundry civil piping and subground conduits with a small storage shed constructed of

Project	Structural Elements
	corrosion resistant materials founded on a concrete floor slab. The revetment wall and land reclamation will be undertaken by the PoTL as a part of the Port of Townsville redevelopment

24 Materials and Finishes

24.1 Materials and finishes will be selected from those readily available locally for their functionality, durability, low maintenance and Ecologically Sustainable Development properties. Commonwealth Government policy requires that Australian or New Zealand goods, materials and associated services will be sought and assessed in terms of value for money before seeking any overseas supply.

25 Mechanical Services

25.1 The new facilities will be primarily air-conditioned and the selection of building services and associated equipment would be required to achieve an economic balance between capital cost and operation and maintenance costs. Areas such as amenities will utilise exhaust fans and natural ventilation. Selection will be based upon a life cycle costing analysis and particular consideration will be given to energy efficient design solutions employing passive solar energy. The new facility will incorporate building management systems, metering and other provisions to measure and monitor energy use and to allow regular energy audits where practicable.

25.2 Materials and finishes will be selected from those readily available locally for their functionality, durability, low maintenance and Ecologically Sustainable Development properties. Commonwealth Government policy requires that Australian or New Zealand goods, materials and associated services will be sought and assessed in terms of value for money before seeking any overseas supply.

26 Hydraulic Services

26.1 Domestic water supply and sanitary drainage from fixtures located within the new facilities will be via new connection to the existing site services infrastructure. The

existing infrastructure system associated with electrical and mechanical services at the Cape Ferguson is to be upgraded. The existing infrastructure system at the Port of Townsville has been determined to be sufficient to accommodate the new facility.

26.2 New stormwater drainage pipelines will be provided where necessary to collect stormwater runoff and direct it into the existing infrastructure system. Rainwater from building roofs will be collected and fed into rainwater storage tanks to be utilised for toilet flushing within the building where practicable to do so.

26.3 Domestic water heating will be provided to the relevant facility by either gas fired instantaneous hot water units or electric heaters where gas supply is not available. The design will be considered for the building dependant on demand requirements and energy efficiencies.

27 Electrical Services

27.1 The AIMS Cape Ferguson site is supplied electricity from the Ergon substation which connects to the AIMS Cape Ferguson site. This supply together with the planned 11KV power supply and backup project is sufficient to meet the increased load requirement to accommodate the new infrastructure within the AIMS Cape Ferguson site.

27.2 Electricity supply for the Vessel Berthing Facility will be connected to the existing infrastructure provided by the PoTL.

27.3 Lighting, power, lightning protection and fire protection will be provided to the buildings in accordance with the relevant Australian Standards. Electrical infrastructure and switchboards will have modest spare capacity to allow for future growth or increased demand.

28 Fire Protection

28.1 All construction and fire protection requirements will, as a minimum, be in accordance with the provisions of the Building Code of Australia (BCA) and all other applicable Codes and Standards. The Manual of Fire Protection and Engineering details AIMS fire protection policy for asset protection and building function protection.

29 Civil Works

29.1 Civil assessments were carried out during the early design stage at each element's new site location. There were no site conditions identified that pose any major civil engineering requirements however, each site will be the subject of further survey and geotechnical investigation during detailed design.

29.2 New roadways will be constructed of asphalt which is deemed the most cost effective and appropriate pavement solution for the Project. The extent of the pavement types will be selected subject to which is deemed the most cost effective and appropriate pavement solution for each relevant project element.

30 Landscaping

30.1 Landscaping works will focus on the restoration of areas disturbed during construction. The landscape design is functional with low maintenance a high priority. A water sensitive design approach has been adopted with plants selected that are indigenous to the relevant site.

31 Security

31.1 In accordance with Government initiatives to improve physical security arrangements across Government Departments, advice from designated security authorities will be incorporated into the design solutions for the proposed facility as appropriate. The security threat assessment will be reviewed during the detailed design phase and the new facility will be secured as appropriate to the classification level required for the activities to be conducted. Appropriate security protection will be provided in accordance with AIMS security policies and specific project requirements e.g. Access Control, Video surveillance, electronic alarming.

32 Noise and Acoustics

32.1 The acoustic performance within the facility will comply with the Building Code of Australia (BCA), relevant Australian Standards, Worksafe National Standard for Occupational Noise (NOHSC:1007(2000)), National Code of Practice for Noise Management and Protection of Hearing at Work (NOHC:2009(2000)) and the EPA Noise Policy.

32.2 It is not envisaged that this project will increase noise output and therefore will not adversely affect the surrounding environments. Externally located mechanical plant will be appropriately selected and treated to minimise noise impact on the environment within a suitable internal and external noise range.

33 Information Communication and Technology

33.1 Passive and active information communication and technology infrastructure works will be provided for the project. The existing site communications fibre optic cable and cable infrastructure will be extended to support the anticipated information, communication and technology services required for the new facilities.

34 Project Cost

34.1 The estimated out-turned cost for the Project is \$49.5 million (excluding GST). This cost estimate includes the construction costs, professional fees, furniture, fittings and equipment, IT infrastructure and equipment, contingencies and an escalation allowance.

34.2 A modest increase in net operating costs is expected due to the construction of the new facilities and the associated increases in facilities maintenance, cleaning and utilities expenses.

35 Project Delivery System

35.1 The Project implementation structure and contracting methodology to be adopted under this Project is designed to address several key aspects:

- (a) AIMS do not have sufficient in-house skills and capabilities to directly manage so many projects in parallel.
- (b) The highest priority projects are the most complex and will take the longest to complete. This contrasts with the requirement to expend funds quickly necessitating the need to commence with lower priority but quick projects. It is therefore desirable to retain flexibility to adjust work-scopes for as long as possible.

- (c) Requirement to work to an exact budget and to match cash-flow and contractual commitments to the provision of funding.
- (d) Defined deliverables need to be provided in accordance with the initial project proposal.

35.2 The implementation strategy is therefore to:

- (a) Establish an internal AIMS project management team that can:
 - (i) Manage a “managing contractor”.
 - (ii) Directly manage several aspects of the project that are not suited (or it is not desirable for flexibility reasons) to utilise a “managing contractor” model; and
 - (iii) Directly drive and manage the design of ATOS and the seawater infrastructure upgrade projects.
- (b) Set out the arrangements to sub-contract the bulk of the civil construction works to a “managing contractor” where the:
 - (i) Managing Contractor contracts with the AIMS to manage the design and construction of the works on behalf of AIMS;
 - (ii) Managing Contractor contracts with the AIMS to provide, at a fixed price, or alternatively at a percentage of the total contract price, certain aspects of the works (for example, the preliminaries, including crane hire, site sheds, supervision services...);
 - (iii) Managing Contractor may perform all or part of the design services;
 - (iv) Managing Contractor will arrange the trade packages, tender and enter into the trade contracts on behalf of AIMS and, potentially, itself perform some of the trade contract works; and
 - (v) Managing Contractor will perform the usual supervision, reporting activities required on the project to keep AIMS informed of the progress of the works.

36 Project Schedule

36.1 Subject to Parliamentary clearance of the Project, construction of all elements of the Project is expected to commence November 2009 and be completed late December 2012.

37 Attachments

Attachment 1: List of Abbreviations

Attachment 2: Location Map

Attachment 3: AIMS Cape Ferguson Site Locality Map

Attachment 4: Cape Ferguson Project Elements Location Plan

Attachment 5: Seawater Infrastructure Upgrade Schematic

Attachment 6: Vessel Berthing Facility Location Plan

Attachment 7: Options Assessment

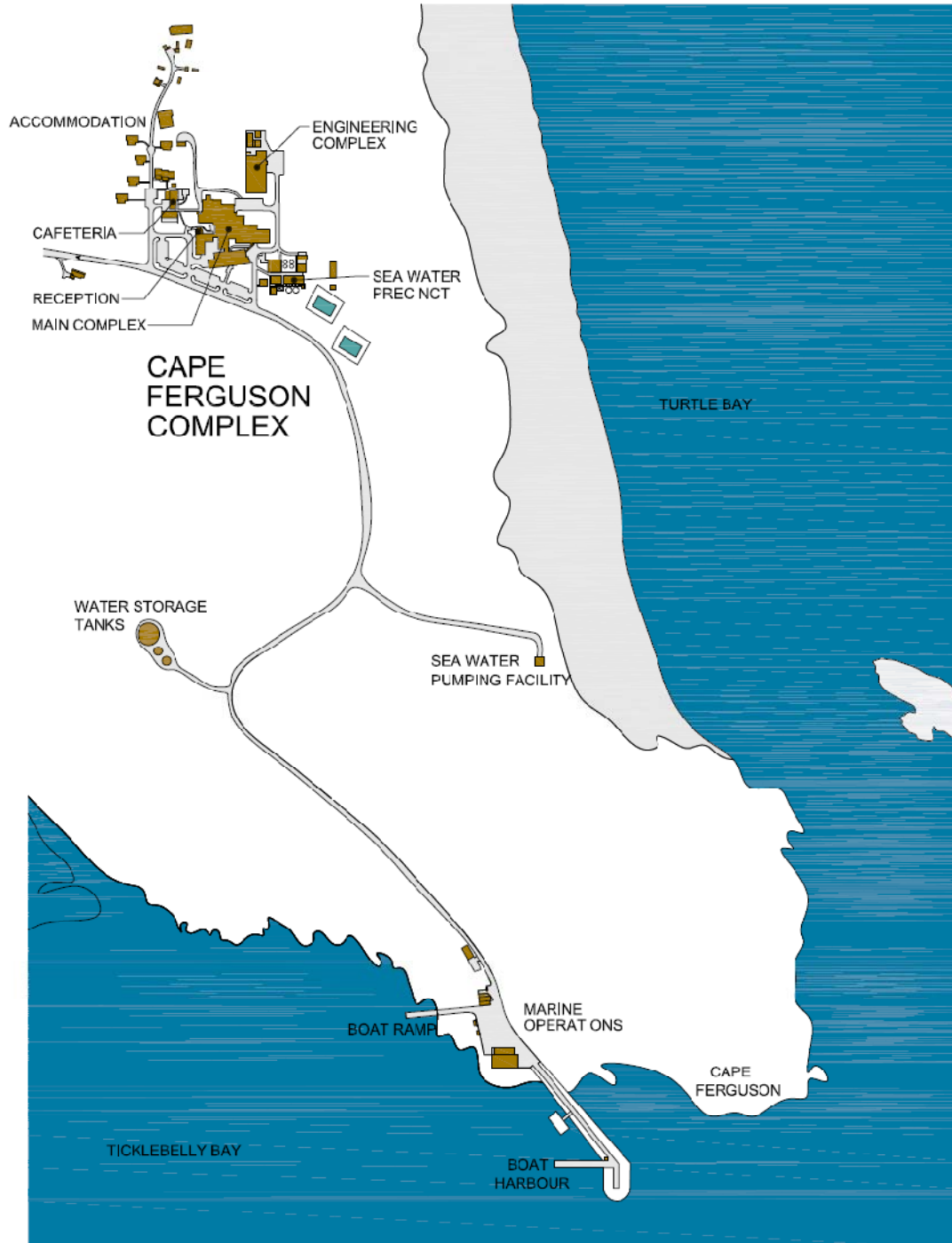
Attachment 1 – List of Abbreviations

ACCA	AIMS Coral Core Archive
AIMS	Australian Institute of Marine Science
ATMRFP	AIMS Tropical Marine Research Facilities Project
ATRF	Arafura Timor Research Facility
BCA	Building Code of Australia
CDU	Charles Darwin University
CEMP	Construction Environment Management Plan
ECC	Environment Clearance Certificate
EIF	Education Investment Fund
ESD	Ecologically Sustainable Development
HVAC	Heating, Venting and Air conditioning
IT	Information Technology
JCU	James Cook University
NGOs	Non Government Organisations
PoTL	Port of Townsville Limited
Project	AIMS Tropical Marine Research Facilities Project – Cape Ferguson and Townsville Works
UWA	University of Western Australia

Attachment 2: Location Map



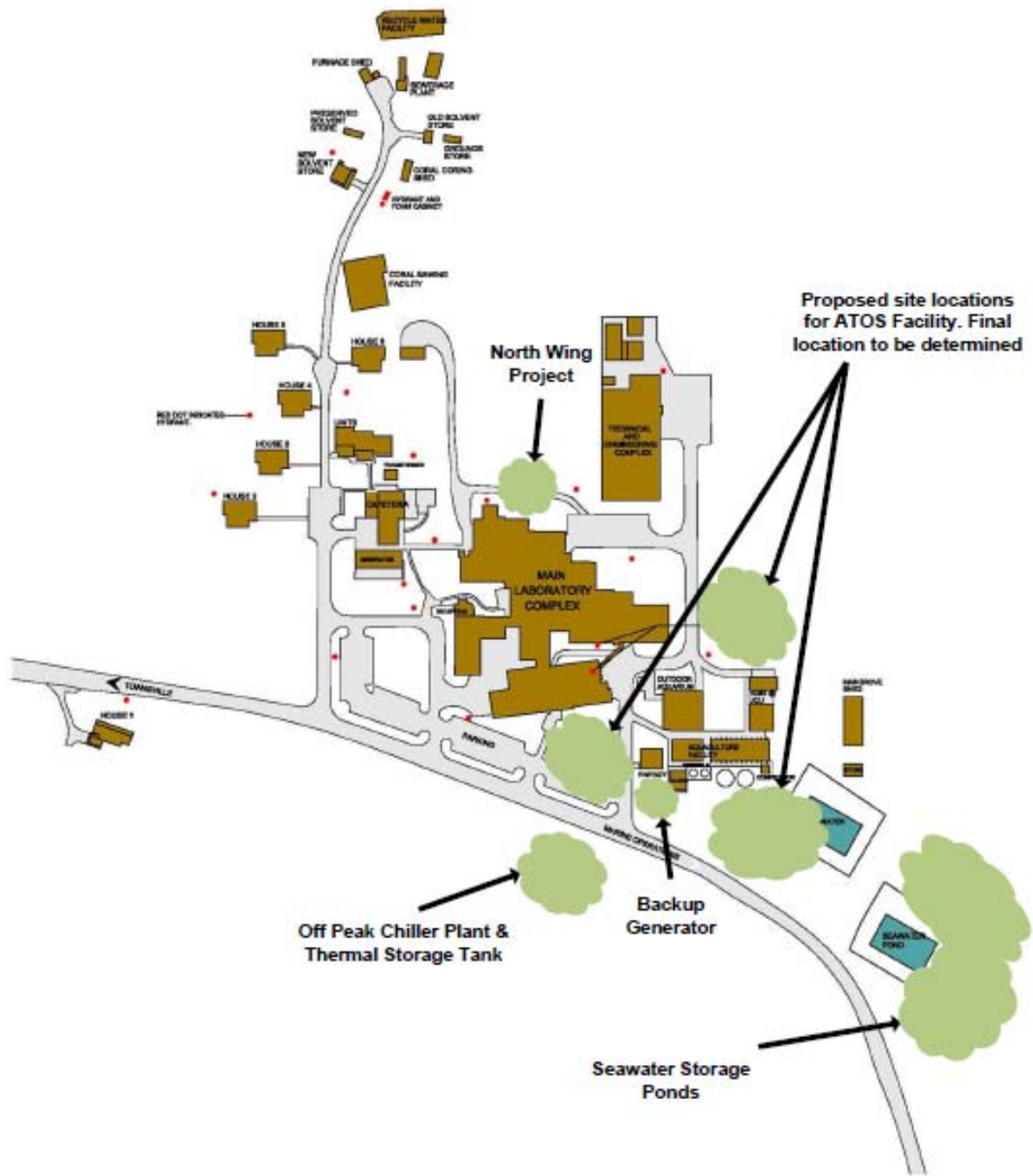
Attachment 3: AIMS Cape Ferguson Site Locality Plan



SITEPLAN



Attachment 4: Cape Ferguson Project Elements Location Plan



MAIN COMPLEX AREA

Attachment 5 - Seawater Infrastructure Upgrade Schematic

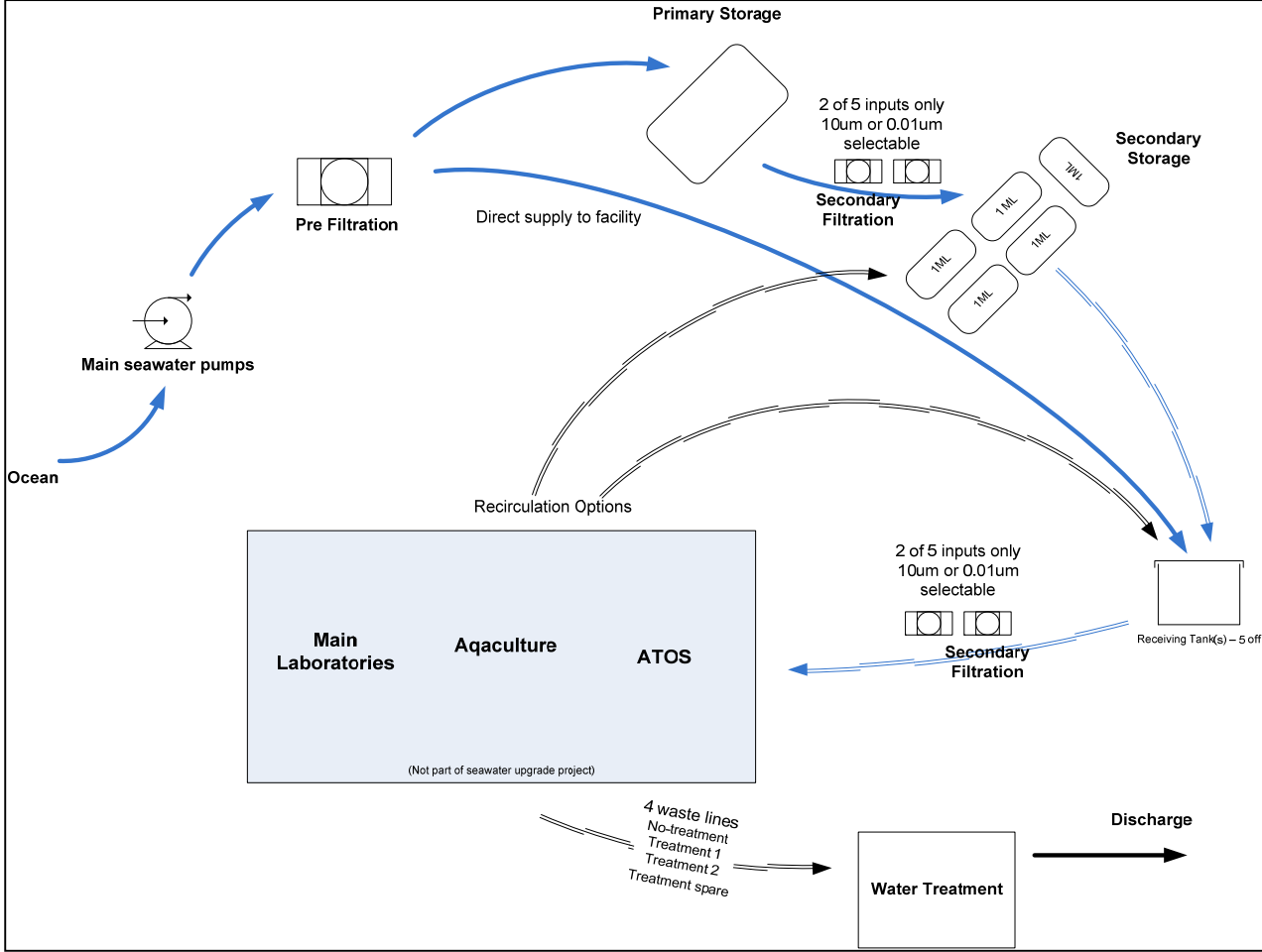


Figure 1: Schematic of the Proposed Seawater Infrastructure Upgrade

Attachment 6: Vessel Berthing Facility Location Plan

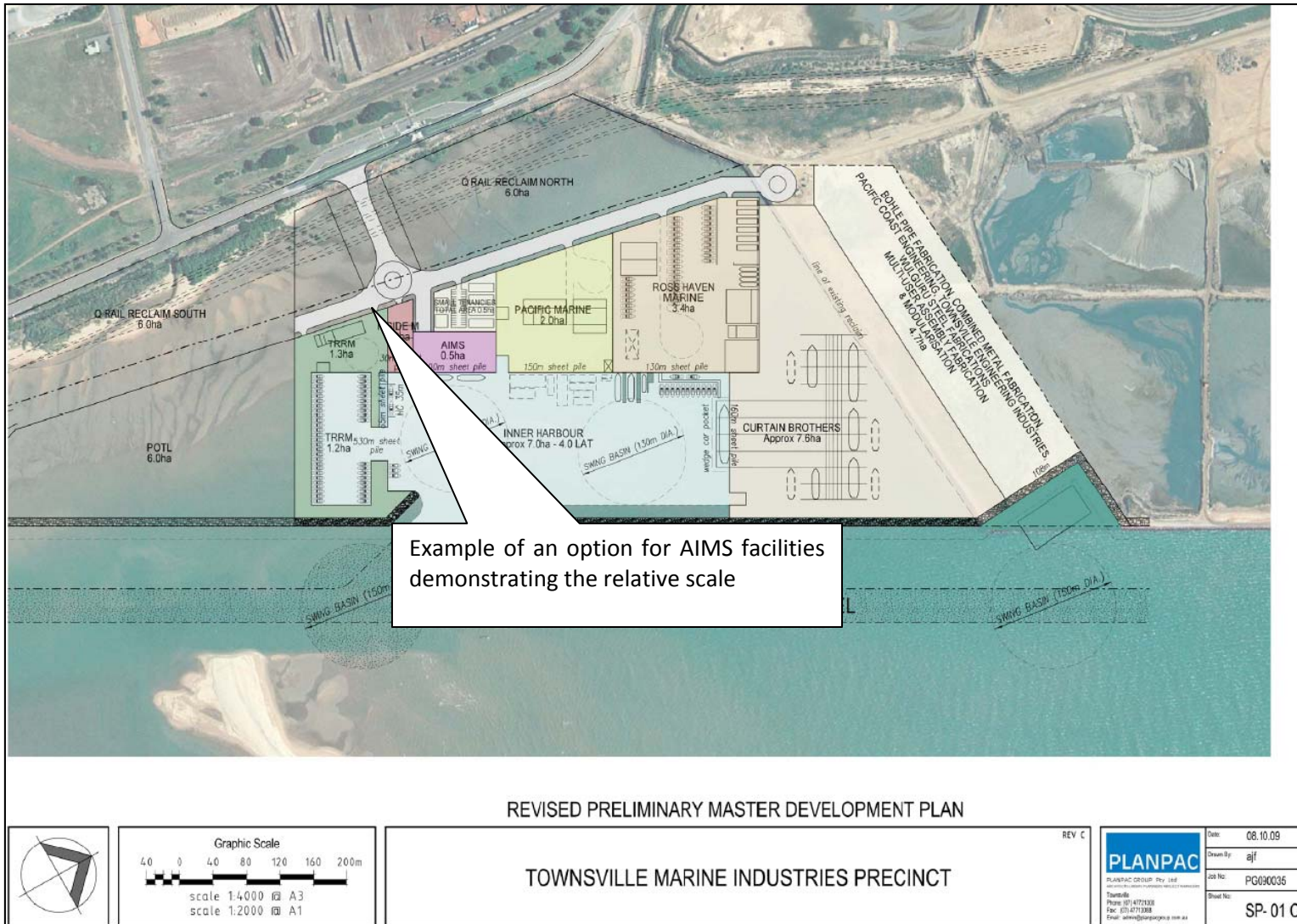


Figure 2: Marine Precinct Concept Diagram

Note: The concept diagram is for illustrative purposes only, the development plans have not yet been finalised and/or approved by Port of Townsville Limited or the potential precinct users.

PROJECT 1: AUSTRALIAN TROPICAL OCEANS SIMULATOR

Capability: Ocean Simulator and Seawater Enhancements

Objective: To Improve AIMS seawater experimental research facilities

Option	Description	Comments
1	Develop facilities at AIMS	Extend the current seawater experimental area at AIMS (increase volume, ability to control temperature, salinity and acidity and create additional experimental spaces)
2	Utilise facilities in a new location	Several small facilities with limited functionality.
3	Develop facilities at another location	Build facility at a site such as JCU or CDU

Summary: The only viable option is to develop the facility at AIMS. No other sites exist that have the combination of access to high quality seawater along with access to microbiology, genetics and other high technology laboratories. Furthermore developing the facility at AIMS is the least cost option since it leverages both existing sea water capabilities and significant complimentary facilities. Locating the facility at AIMS requires an extension to existing capabilities rather than development of a green field system.

Recommended Option:

If Australia is to have the capability as described above, then the only viable option is to develop the facility at AIMS. It is therefore recommended that the option of developing a facility at AIMS be progressed.

PROJECT 2: SEAWATER INFRASTRUCTURE UPGRADE

Capability: Ocean Simulator and Seawater Enhancements

Objective: To Improve AIMS seawater supply infrastructure

Option	Description	Comments
1	Operate fully using a recirculation system	Modify systems so that all experiments operate off a closed loop recirculation based system.
2	Install sophisticated filtration and salinity adjustment systems plus increased pumping capacity	Recirculation systems require that the water is effectively sterilised prior to recirculating through the system. This is not feasible as a significant proportion of experiments require natural content/levels of nutrients and micro-biology. Avoids the need to increase pumping capacity.
3	Install ultra filtration (10um to 0.01um) and filter the fine clay sediments from the water during periods of high water turbidity. Install a salinity increasing system to increase salinity during extreme wet periods	Unfortunately ultra filtration would also filter out the micro- biology and nutrients in the water making it unsuitable for the majority of research experiments. Adjusting the salinity level of large volumes of sweater is not technically or economically feasible. It is not a simple matter of adding salt, and even of this was the case extremely large quantities would be required
3	Increase pumping and storage capacities along with partial recirculation capabilities.	Install large storage tanks/ponds such that during periods of high turbidity or low salinity stored seawater can be utilised for experiments where low turbidity and normal salinity are required.

Summary: The only viable option is to increase the pumping and storage volumes. All other options would result in significant and critical reductions in the seawater experiment research possible at AIMS. It is the only option that meets the required functional objectives.

Recommended Option:

That the option of increasing seawater storage and extraction capability along with limited recirculation be adopted.

PROJECT 3: TROPICAL COLLECTIONS FACILITY AND OFFICE EXTENSION

Capability: Expanded facilities to support growth in Townsville

Objective: To create additional space for AIMS scientists in support of increased co-funded research resulting in increased numbers.
To improve the storage (ad access) facility of AIMS internationally significant coral core and bio-resources collections.

Option	Description	Comments	
1	Develop the facilities at AIMS	Construct new buildings adjacent to existing buildings, utilising existing services.	Resources located where they can collaborate with the other AIMS staff. Resources located where they have access to the required laboratories and other scientific equipment. This option allows locating all staff at a single location provides optimal team management.
2	Move AIMS staff to other locations	Move existing staff and/or employ new staff at AIMS Darwin or Perth locations	Darwin facility is small and already full. The proposed expansion will be filled by NT growth. AIMS do not own facilities in Perth and already has severe space restrictions at UWA where it rents space. Any new space and UWA would be utilised to support WA activities
3	Utilise facilities in a new location	Rent office and storage space at a new location (Townsville, Perth or Darwin)	Resources not located where required resulting in significant logistics issues. Rental in Perth is not possible adjacent to existing location Significant operational costs (rent, IT etc) for which AIMS has no budget

Option	Description	Comments
4	Develop facilities at another location.	Construct the facilities at Perth or Darwin, JCU or in Townsville City. Resources not located where required resulting in significant logistics issues. Developing facilities at Perth is not possible since AIMS is located on the UWA site where space is at a premium. Development costs at Darwin, JCU and in Townsville would be higher than at AIMS since land would need to be purchased and/or existing services could not be utilised

Summary: If AIMS facilities are to be expanded as required to support growth in Townsville then the most viable options are constructing at AIMS Cape Fergusson site or renting a facility in the City or JCU (50km away). The existing site is the lowest cost construction location and therefore other sites are not considered further. While renting could occur at other locations Townsville is the closest and would have the lowest operational costs, therefore other rental locations are not considered further. The viable options are therefore to construct facilities at AIMS Cape Fergusson site or to rent facilities in Townsville (City or JCU).

Recommended Option:

It is recommended that facilities be constructed at AIMS current Cape Fergusson complex. The logistics of operating staff from Townsville and/or storing samples that are utilised on a daily basis offsite is not operationally feasible. Townsville is 50km from the complex and the travel logistics would be prohibitive and environmentally unsound.

PROJECT 4: 11KV POWER SUPPLY AND BACKUP

Capability: Expanded facilities to support growth

Objective: Secure and enhance the Cape Fergusson 11KV supply.

Option		Description	Comments
1	Do nothing	AIMS electrical supply service becomes increasing unreliable and would not have sufficient capacity to supply the new facilities.	Does not meet functional needs.
2	Implement 11KV enhancements	Provision of adequate high voltage supply and backup diesel generator.	This project will improve electrical supply reliability critical to AIMS' functional needs. Scope to incorporate a "ring main" site distribution system, further increasing supply reliability to critical facilities.

Summary: The only viable option is to upgrade the 11KV system.

Recommended Option:

The 11KV system be upgraded to both increase output and to improve reliability by increasing backup generation capacity and utilisation of a ring main methodology.

PROJECT 6: OFF PEAK CHILLER PLANT

Capability: Energy Usage Reduction

Objective: To improve the efficiency and increase capacity of AIMS HVAC and seawater cooling systems

Option	Description	Comments
1. Do Nothing	Retain the existing systems and incorporate stand-alone systems in any new facilities	Does not address the growing issue of sharply increasing electricity prices. North Queensland has a severe peak period electricity shortfall and this is being reflected in increased costs (15% per year increases). Provides no environmental benefits since cooling still occurs during peak energy consumption periods. Expensive to operate existing plant and inadequate to meet projected cooling loads of the new facilities.
2. Expand using existing technology.	Expand cooling capacity using the existing compressor based central cooling system.	The same disadvantages as Option 1, however would be slightly lower cost.
3. Implement an off-peak central chiller plant	Utilise low cost off-peak power to chill a large water reservoir then subsequently utilise this as a “cold” source for air-conditioning and seawater chilling.	This option significantly reduces AIMS peak power usage by shifting load into night periods. This both reduces AIMS electricity usage costs, but also provides regional benefits by “freeing up” transmission capacity. It provides a direct cooling source for the low cost adjustment of seawater temperature. Significant reductions in annual electricity supply costs. Much improved reliability of air-condition and seawater chilling since short power outages (up to 6 hrs) will have no impact on

Option	Description	Comments
		output due to the “stored” cold energy source.

Summary - The option of installing an off-peak chiller plant and energy reduction activities is the only option that meets the project objectives of:

- Reduced costs
- Reduced environmental impact
- Increased reliability
- Increased capacity

The option uses established technology with several similar plants in the Townsville region (for example James Cook University) and good local support.

Recommended Option:

It is recommended that an off-peak central chiller cooling system be installed and energy reduction activities are implemented at the Cape Ferguson Site.

PROJECT 7: ENERGY EFFICIENCY PROJECT

Capability: Energy Usage Reduction

Objective: To reduce general energy consumption at the Cape Fergusson Site.

Option	Description	Comments
1. Do nothing	Energy consumption will continue to rise.	Does not address the ongoing operating costs to meet the objectives of Government initiatives regarding energy efficiency. Does not address the increased electricity utilisation associated with other projects in this proposal.
2. Implement highest priority items as identified in the 2008 energy audit.	Implement energy monitoring & control systems, upgrade main complex air handlers and install LED lighting.	These activities aim to reduce the carbon footprint and ongoing operating costs. While a specific energy reduction target has not been set preliminary assessments are that a 10% site reduction is feasible due to these changes.

Summary: The do nothing option provides no benefits and does not assist in AIMS meeting its carbon footprint reduction targets.

Recommended Option:

Implement and energy monitoring system and control system, upgrade the main complex air handlers and install LED lighting.

PROJECT 8: VESSEL BERTHING FACILITY

Capability: Vessel Berthing and Operational Facility

Objective: To secure permanent berthing facilities for AIMS two large research vessels

Option	Description	Comments
<p>1. Purchase / construct facilities in new commercial precinct</p>	<p>A new light commercial precinct is to be built by private developers to allow existing users affected by the Townsville River closure to relocate. AIMS could purchase/construct permanent berthing, storage and parking in the new facility</p>	<p>No other viable alternatives located in Townsville. AIMS will be able to offer the facility to visiting research vessels. This could encourage international research vessels to dock in Australia and increase opportunities for collaborative work. Meets functional and HSE requirements</p>
<p>2. Rent space in new light commercial precinct</p>	<p>As per the above option, however rent the facilities.</p>	<p>AIMS do not have sufficient operational funds to fund the ongoing lease costs for this option. Development of the precinct was tendered to private developers, however no submissions were deemed to be acceptable and Townsville Port is now developing the site. They have indicated that they require a minimum of 10% return on any Port of Townsville funds invested in the project, furthermore that they are cash constrained. AIS would therefore most likely need to enter into an agreement to sublease a site from one of the other companies who will be located in the marine precinct. Given that they will require a high return on capital to offset risk, their “cost of capital” will be significantly greater than AIMS. No certainty as to ongoing costs.</p>

Option	Description	Comments
		<p>No certainty as to ongoing ability to utilise the space beyond any initial rental period.</p> <p>This opportunity is unlikely to be repeated within the next 25 years.</p> <p>Low initial capital cost</p>
<p>3. Locate vessels in another existing location in Townsville</p>	<p>Lease wharf space in the Townsville creek</p>	<p>This option has been explored and no locations are currently available, neither are any forecast into the future. All permanent berth spaces are utilised by commercial ferry and barge operators, along with emergency services.</p> <p>The vessels are too large to enter the marina precincts</p>
<p>4. Utilise heavy commercial port</p>	<p>Utilise the heavy commercial when in Townsville</p>	<p>Requires use of a Pilot, cannot load/unload in same location as fuelling vessel therefore multiple movements required (each needing a pilot). Access to the wharf is restricted to Port Access Card Holders only. This severely restricts the ability to access the vessel, a significant issue for visitors (e.g. visiting scientists).</p> <p>The primary issue (and showstopper) is the OH&S risk of getting persons on and off the vessels. AIMS vessels are too small and hence low for the wharfs. Vessel access is only possible via a ladder (corroded and slippery) and this practice is banned by AIMS OH&S procedures. Since the vessels would be directed to different locations each time they berth, construction of a floating pontoon or other access device is not possible.</p>
<p>5. Develop berthing facilities at AIMS Cape Ferguson Site</p>	<p>AIMS have an existing wharf at its Cape Ferguson site that could be modified to allow permanent berthing (currently the vessels can only tie up</p>	<p>For this to occur the following modifications would be required.</p> <p>Significant strengthening of the existing wharf to enable the vessels to tie up in high sea/wind states</p> <p>Deepening of the water (significant dredging in a area of the GBR</p>

Option	Description	Comments
	at high tide).	designated as a research zone) Very significant increase in the protection wall (extended and raised) such that the wharf is an all weather berth - including cyclones. These modifications while not accurately costed would be more than \$25m.
6. Move vessel berthing to another Port	No longer berth the vessels in Townsville but move them to Cairns or south to Bowen/Mackay/Rockhampton.	Not suitable as equipment and personnel are located in Townsville. This is a valid (and utilised) option to short stops between or mid field trips; however the logistics of operating from another port would be prohibitive.

Summary - The only viable options are to either rent or purchase space in the new light commercial marine precinct to be developed by the Port of Townsville Ltd. Furthermore gaining access to the new commercial precinct is a one off opportunity that is unlikely to be repeated within the next 20 years. It is unlikely that “spare” waterfront berths are to be developed, therefore access must be negotiated as part of the precinct planning.

Recommended Option – It is recommended that AIMS purchase/construct facilities in the new precinct rather than rent. This will provide long term berth security and is the lowest cost option. Furthermore the flexibility created by construction a purpose built facility will enable AIMS to offer the facility to international research vessels with the increased visits to the Townsville region creating opportunities for collaboration.